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PETITION FOR REGISTRATION OF UTILITY MODEL

September 10, 1973

The Hon. Director-General of the Patent Office

1 Title of the Contrivance

Iron core for a linear motor

2. Contriver

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5. List of Appended Documents

- | | |
|----------------------------|--------|
| (1) Specification | 1 set |
| (2) Drawing | 1 copy |
| (3) Power of Attorney | 1 copy |
| (4) Record copy of Request | 1 copy |

SPECIFICATION

1. Title of the Contrivance

Iron core for a linear motor

2. Claim

An iron core for a linear motor comprising teeth portions and yoke portions, wherein the teeth portions are provided with protrusions, the protrusions are sized such that their width is identical to or less than the leg width of the teeth portions of the iron core, separately produced coils are pressed on the teeth portions, and the teeth portions are pressed and secured into the yoke members.

3. Detailed Description of the Contrivance

The present contrivance relates to structure of the iron core of a linear motor. In the drawings, Figure 1 shows a horizontally sectional view of a conventional linear motor for single-phase operation. A principal iron core 1 and an auxiliary iron core 3 are opposedly disposed such that they are 90 degrees out of phase from the viewpoint of the electromagnetic waves, and a secondary conductor 5 passes through a clearance between them. The iron cores 1 and 3 have windings applied to their respective teeth. A principal winding 2 and an auxiliary winding 4 are arranged such as to be 90 degrees out of phase in the electromagnetic waves by using a condenser or any other similar means.

In a linear motor thus arranged, in order to apply the winding to each tooth of each iron core, an electric cord is formed in a ringed configuration, as shown in Figure 2, and is forced into an aperture 7 from each slit 6.

For this reason, long working time is needed to mount the iron cores with the windings, and moreover, the electric cord may easily be damaged when it is passed through the slit. This causes a fault in the insulation of the electric cord. Also, the electric cord is incomplete in its alignment, and this does not allow any enhancement of the occupying proportion of the electric cord within each aperture. These are disadvantages of the iron cores of the conventional linear motor.

The present contrivance is intended to remove the disadvantages described for the iron cores of the conventional linear motor in the foregoing. A preferred single embodiment of the present contrivance is depicted in Figures 3 and 4.

As shown in Figure 3, an iron core for a linear motor comprises teeth portions 8 and yoke portions 9, and the teeth portions 8 are provided with protrusions 10. The protrusions 10 are sized such that their width are identical to or less than the leg length of the teeth portions 8 of the iron core. The teeth portions 8 have coils 14 pressed on them from the sides of the protrusions, and are thereafter pressed and secured into the yoke members 9. In each of the coils 14, an electric cord 12 is wound to an insulator 13, and is fixed by means of insulating paper 13, as shown in Figure 4. Figure 5 shows a linear motor for which the iron core described in the foregoing is used.

The application of the iron core according to the preferred embodiment of the present contrivance allows the separately produced coils to be pressed on the teeth portions 8 of the iron core. Therefore, in the iron

core according to the present contrivance, there is no need for insertion of the coils from the slits of the iron core into its apertures as in the conventional iron core for a linear motor, and this greatly shortens the working time for the attachment of the windings, while at the same time, any faulty insulation of the iron core can be prevented which may be caused by an injury of the electric cord which can be created at the time of the windings mounting works. Moreover, the iron core according to the present contrivance is allowed to bring the coils into close contact with the teeth portions. Also, in the iron core according to the present contrivance, since the electric cord can be wound in good alignment, the occupying rate of the electric cord within each aperture can be greatly improved, and simultaneously, the amount of use of the electric cord can be decreased.

The protrusions of the teeth portions 8 may be in a rectangular, wedge-shaped or any other similar-shaped configuration, with the same effect as in the oval-shaped configuration used in the preferred embodiment of the contrivance.

4. Brief Description of the Drawings

Figure 1 is a planar sectional view of the conventional linear motor. Figure 2 is a perspective view of the winding applied to the conventional linear motor. Figure 3 is an exploded perspective view of the iron core for a linear motor according to a single preferred embodiment of the present contrivance. Figure 4 is a perspective sectional view of the coil applied to the iron core shown in Figure 3. Figure 5 is a planar sectional

view of a linear motor to which the iron core depicted in Figure 3 is applied.

8.....Teeth portion of the iron core 9.....Yoke 10.....Protrusion,
14.....Coil

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP00/07669

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl.⁷ H02K41/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl.⁷ H02K41/02-41/035
H02K9/08-9/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1926-1995 Jitsuyo Shinan Toroku Koho 1996-2001
Kokai Jitsuyo Shinan Koho 1971-1994 Toroku Jitsuyo Shinan Koho 1994-2001

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US, 3913045, A (AEG Elotherm G.m.b.H), 14 October, 1975 (14.10.75), Column 2, lines 21 to 55 & JP, 50-44406, A (AEG Elotherm G.m.b.H), 21 April, 1975 (21.04.75), page 2, lower left column, line 14 to lower right column, line 17 & SE, 7409865, A & DE, 2339318, A & FR, 2239798, A & GB, 1434151, A & CH, 576722, A & IT, 1018798, A & IT, 1018798, B	1-7 8
Y A	JP, 2-65005, U (DAIFUKU CO., LTD.), 16 May, 1990 (16.05.90), Figs. 4, 5 (Family: none)	1-7 8
A	JP, 63-18956, A (Anwaa Chitayato), 26 January, 1988 (26.01.88) (Family: none)	1-8
A	JP, 50-93204, U (Mitsubishi Electric Corporation), 06 August, 1975 (06.08.75) (Family: none)	1-8

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
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Date of the actual completion of the international search
11 January, 2001 (11.01.01)Date of mailing of the international search report
23 January, 2001 (23.01.01)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP00/07669

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 5-83923, A (Hitachi Kiden Kogyo, Ltd.), 02 April, 1993 (02.04.93) (Family: none)	8
A	JP, 50-52416, U (Matsushita Electric Ind. Co., Ltd.), 20 May, 1975 (20.05.75) (Family: none)	8